ARMY COMMUNICATOR

January 2022

Network Transport Diversity

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COL James D. Turinetti IV
Signal School Commandant

CSM Darien D. Lawshea
Signal Corps Regimental Command Sergeant Major

CW5 Chris Westbrook
Signal Corps Regimental Chief Warrant Officer

MAJ Ryan Gray
Editor

On the Cover

Soldiers from the 50th Expeditionary Signal Battalion-Enhanced (ESB-E), 35th Signal Brigade, support the Phoenix E-Model satellite terminal user demo conducted by Project Manager Tactical Network at Fort Bragg, North Carolina. The modular Phoenix E-Model enables Soldiers to completely remove all of the equipment from the vehicle in transit cases, so they can easily deploy and operate the system without the vehicle to support a variety of different missions around the world.
Photo by Amy Walker

Team Signal,

Happy New Year! I hope everyone had a wonderful holiday season and is excited as we are for what's to come in 2022. Last year was full of challenges and no doubt this year will see some unique ones of it's own, but I have every confidence in our combined ability to meet and overcome any and all difficulties we face.

As I've said in the past, communication technologies and methodologies are constantly evolving, sometimes on a large scale and at other times subtlety. The *Army Communicator* has always reflected this through big changes, such as our relaunch as a digital publication three years ago, and small ones, such as our annual design refreshes. You've undoubtedly already noticed some tweaks to the layout this issue, and you'll see some more in the coming months. Contact our team to let us know what you think. The *Army Communicator* is the official publication of the Signal Regiment, which means we want you to have a say in not just what we publish, but how we present material as well.

Pro Patria Vigilans!

COL James Turinetti IV
Signal School Commandant

CSM Darien Lawshea
Regimental CSM

CW5 Chris Westbrook
Regimental CWO

Phoenix E-Model satellite terminal supports larger echelons, transport diversity

Amy Walker
PM Tactical Network/PEO C3T

Soldiers from the 50th Expeditionary Signal Battalion-Enhanced (ESB-E), 35th Signal Brigade, support the Phoenix E-Model satellite terminal user demo conducted by Project Manager Tactical Network. Photo by Amy Walker

In line with the Army's recently released Unified Network Plan to posture the force for future multi-domain operations, the new Phoenix E-Model ground satellite terminal will provide network transport diversity, greater mobility, and enhanced operational flexibility.

As part of the Army's scalable Expeditionary Signal Battalion-Enhanced (ESB-E) Capability Set (CS) 21 baseline equipment package, the Phoenix E-Model will soon serve as the large ground satellite terminal for ESB-E formations, in addition to the units' smaller Scalable Network Node (SNN) terminals, further expanding communication capacity and flexibility. The versatile quad-band Phoenix E-Model will enable ESB-Es, as well as Multi-Domain Task Force formations, to deliver expeditionary, high-bandwidth network connectivity to large division, corps, and taskforce-size headquarters.

"It's about scalability," said Lt. Col. Mallory Wampler, commander of the 50th ESB-E, 35th Corps Signal Brigade. "We are fighting as divisions again, and the depth of the corps battlespace is where Phoenix E-Model comes in."

This winter, the Army's Project Manager Tactical Network, at the Program Executive Office for Command, Control, Communications-Tactical (PEO C3T), will field the Phoenix E-Model to the first unit, the 50th ESB-E, which

was also the first unit to be equipped with the initial CS21 ESB-E equipment package. The 50th ESB-E served as the pilot unit for the entire ESB-E effort, including the Phoenix E-Model development, providing feedback to inform design and fielding decisions to modernize the Army's ESB formations. Compared to previous capabilities, the new ESB-E beyond-line-of-sight and line-of-sight communications systems are smaller, lighter and faster to deploy and set up, easier to operate, and together provide increased network communication Primary, Alternate, Contingency and Emergency (PACE) plan options.

The Army began fielding the first few ESB-Es with the initial ESB-E equipment package in fiscal year 2021, and the program office will continue to field a few ESB-Es per fiscal year until all of its 23 ESBs have been upgraded to the full CS21 baseline capability. The Army's agile acquisition and fielding approach aligns with its two-year incremental capability set fielding process, which will allow the service to enhance the ESB-E baseline capability if Soldier feedback warrants it or if emerging technologies become mature enough to be procured.

"When the Army leaned into the 50th ESB-E to provide Soldier feedback to help modernize the current Phoenix system, it had several things in mind – the terminal needed to be modular and scalable, expeditionary, and enable signal path diversity in network contested and congested environments," said Lt. Col. NaTasha Wayne, product manager for Satellite Communications, Project Manager Tactical Network. "We relied heavily on Soldier feedback to support continual industry enhancements to deliver a system that meets all of these goals."

In the configuration of the current Phoenix D-Model components are integrated onto the vehicle platform, but the modular new E-Model is transit case-based. If needed, Soldiers can completely remove all of the equipment from the vehicle and easily deploy and operate the system without the vehicle to support a variety of different missions around the world.

"ESB-E operations are really fast-paced," said Spc. Austin Kersey, 50th ESB-E network systems operator, during a recent Phoenix E-Model user demonstration. "We have to be able to get where a unit needs us to be in a quick manner, to deploy quickly, get our systems up quickly, and get all users what they need, when they need it, as soon as we can. I have seen the changes the Army has made with these systems [to support that], and Soldiers are actually being listened to."

The Army assessed the Phoenix E-Model's capability to leverage commercial satellites in the Medium Earth Orbit (MEO), during Project Convergence 21.
Photo by Spc. Emely Opio

Led by Project Manager Tactical Network, the Phoenix E-Model user demonstration, supported again by the 50th ESB-E, concluded in early November, at Fort Bragg. The month-long demonstration was the culminating assessment in a series of operational and developmental tests aimed to ensure that the Phoenix E-Model met all threshold requirements prior to official

delivery and fielding. The event provided the ideal opportunity for the program office to verify previously implemented design changes made through the interval Soldier-centric design process.

"The Army's Unified Network Plan requires our hardware, software, and Soldiers to enable a secure and survivable network," Wampler said during the user demo. "Transport diversity is critical to the success of the future force. We must assume our near peer adversaries will challenge mission command and create a denied environment for commanders to operate within. That being said, the number of modems in the Phoenix E-Model allows us to tie into any Army network with any band; the opportunities are endless."

In addition to operating on traditional Geosynchronous Earth Orbit satellites, the Army is also assessing the potential to leverage the Phoenix E-Model to operate on emerging commercial Medium Earth Orbit (MEO) constellations. MEO satellite capability is expected to provide significant reduction in network latency and an order of magnitude increase bandwidth, as well as adding signal path options for contested or congested network environments.

The Army assessed the potential Phoenix E-Model MEO capability during the Project Convergence 21 network modernization exercise in October and November at Yuma Proving Ground, Arizona, and Joint Base Lewis McChord, Washington. The Project Convergence series of exercises supports capability set development and the improvement of Joint All Domain Command and Control. In preparation for the event, the Army assessed the Phoenix E-Model's MEO capability during a lab-based risk reduction event in July, at the Joint Engineering Satellite Center at Aberdeen Proving Ground, Maryland. The service will continue to experiment with the terminal's MEO capability to inform capability set design and fielding decisions.

"Having a survivable network, something that is less contested by an adversary, being able to provide mission command in a denied environment because of the advantages that come from leveraging MEO is going to be a win for the Army," Wampler said. "Transport diversity is something that every S6 (communications officer) requires in order to provide commanders with the network communications and common operating picture that they need for decision dominance. The Phoenix E-Model, in combination with the rest of our ESB-E kit, will help us obtain that."

The flexible quad-band terminal operates on four different satellite bands, and its dual-head capability enables the use of two antennas on two different frequency bands, or two different satellites, simultaneously. This reduces manning requirements for equivalent capability, doubles bandwidth throughput, and enhances multipath diversity and resiliency within the tactical network.
Photo by Amy Walker

Soldiers, Radio Operators compete in 'Noble Skywave'

Master Sgt. Jean Burgos (10th CAB BDE S6 NCOIC) installs center conductor and radials to a 16' vertical whip antenna to an HF coupler providing omnidirectional low-angle radiation patterns for ground-wave and skywave propagation from 2 to 30 MHz.
Courtesy photo

Master Sgt. Jean C. Burgos
10th Mountain Division, Combat Aviation Brigade

Since 2013, the Canadian Communications and Electronics branch has brought hundreds of teams from dozens of Nations together to test, strengthen expertise and compete in a friendly atmosphere to what is now known as the most Prestigious military-led High Frequency (HF) competition in the world: Noble Skywave.

Noble Skywave acquired its "letters of nobility" through highly skilled and proud participating teams, which are either HAM (Amateur Radio Operators) / Canadian Forces Affiliate Radio System (CFARS) / Military Auxiliary Radio System (MARS) or Military Radio Operators from all NATO branches around the globe. As the Leading Nation for this event, the Canadian Armed Forces have been committed to providing the best possible training experience to crown the best HF Radio Operators in the world. This event is led by the 21 Electronic Warfare Regiment, Canadian Forces Base (CFB) Kingston.

Exercise Noble Skywave 2021 consisted of three categories Free Play Challenge, Team Contact Challenge, Back to the Future Challenge, and a check-in phase. During the Free Play Challenge, participants attempt to contact as many teams as possible from a list of provided frequencies using various modes using Single Side Band (SSB), 2G ALE, and 3G ALE voice and data. The Team Contact Challenge consisted of participants contacting teams based on SSB, 2G ALE, and 3G ALE capabilities. The Back to the Future Challenge consisted of all teams attempting to contact as many teams as possible

using SSB voice and data. The scoreboards are calculated based on equipment power capabilities 150Watts-400Watts and 0Watts-150Watts for each mode SSB, 2G, and 3G ALE.

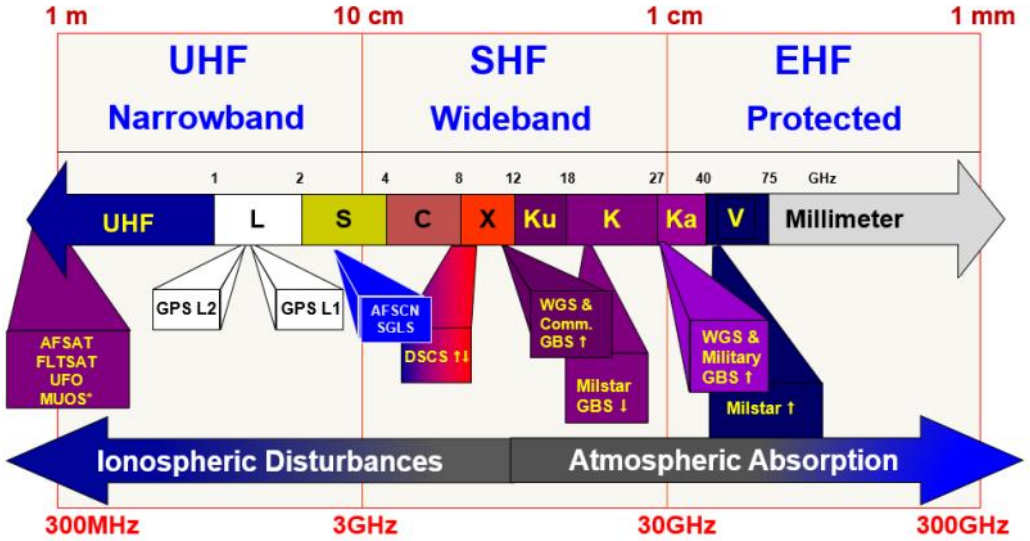
The 10th Mountain Division (LI) registered and participated in all three categories of the competition that started 1000 on 27 October 2021 led by Sgt. 1st Class Robert Snyder from 1 Brigade Combat Team, 10th Mountain Division (LI). Along with his team, Snyder coordinated all efforts to get the 10th MTN DIV to be crowned as the best HF Radio Operators in the world for the 0Watts-150Watts category. This is a massive accomplishment as each country has very skilled, talented, and equipped members in the competition. 1 BCT set up in the BDE HQ building, employing every available antenna they could scavenge. The 10th CAB set up as part of the BDE TAC tent operating expediently with a few soldiers from the BDE S6 and Fires sections, 6-6 Squadron, C 277 Signal Company. The 10th MTN DIV Soldiers showcased their expertise, grit, and determination to contact as many teams as possible after setting up their HF radios, conducting checks, identifying the correct frequencies to location/ time of day using proper radio etiquette. The 10th MTN DIV competitors pushed their military equipment to the limit to prove that we can communicate anywhere globally and that we are a force to be reckoned with. The competitive nature of this competition brings out the best in each other. It serves to strengthen the relationships with our Canadian Forces and our NATO allies from our backyard. Some of the contacts made by the 10th MTN DIV team from Fort Drum were: Latvia (4,077 miles), Alaska (5,000 miles), Hawaii (7,770 miles), Peru (4,880 miles), Djibouti (11,295 miles), JBLM (3,500 miles), Florida (1,800 miles), Vancouver (3,500 miles), Edmonton (2,900 miles), Regina (2,200 miles), Winnipeg (1,700 miles), Ontario (1,100 miles), Nova Scotia (1,000 miles), Quebec (500 miles), Montreal (230 miles), Toronto (300 miles) and many more without the use of repeaters or satellite communications.

Participants experience real-world training that cannot be replicated in a classroom environment. This experience is paramount for the professional development of our force. They learned that it is critical to train and maintain their radio equipment to rely on it. Recognizing efforts for this event can help motivate all soldiers to learn more about HF capabilities. This type of event certainly increases proficiency and skills to become more lethal on any battlefield. Modern technologies have evolved dramatically, but HF has remained the staple in emergency communications for many years since WWII. Efforts need to be taken to continue to incite interest in this capability and continue the efforts to strive for excellence.

Pvt. 1st Class Jorge Zuniga conducts long distance HF radio check using a PRC-150 and a dipole antenna.
Courtesy photo

Training opportunity for contested domains

2nd Lt. Lucas S. Catron and George Gloyd
E Co., 53rd Signal Battalion



The SATCOM Spectrum
Graphic from 2019 Army Space Cadre Basic course

When an element or unit is deployed / operating in a forward or contested environment, communications can become degraded or completely stopped. The infrastructure locally may be slow or non-existent. Satellite communications are one of the options taken to provide long haul communications to units in these situations. Globally spanning and wide reaching, these systems are not without vulnerabilities. In particular consideration is electromagnetic interference (EMI).

EMI can be caused by a variety of sources. Some EMI is naturally occurring. As technology has continued to develop and become widespread, a lot is manmade. Hobbyist, commercial entities, and foreign governments all have the ability to send an electronic signal to space. These can overlap and interfere with each other. These instances can range from inconsequential unnoticeable accidents to malicious and intentional blackouts.

Training satellite communications teams against EMI can be a difficult. Aggressor teams can cost sums that are unfeasible or unjustifiable to commands juggling multiple priorities. This kind of training can additionally have a long and in depth planning and reviewing process. This is where Wideband Global Satellite (WGS) constellation comes in.

Used to replace much of the old Defense Satellite Communications system (DSCS) constellation, one WGS Satellite has more usable bandwidth than the entirety of the DSCS constellation at its peak. The operating bands of this constellation are X (7.25GHz-8.4GHz) and Ka (20.2GHz-21.2GHz and 30GHz-31GHz). Commonly serviced terminals are Hawkeye III Lite, AN/TSC-167A (STT), AN/TSC-185(STT), Ranger Terminals, SNAP terminals, and inflatable Satellite Communications Antennas (ISAs).

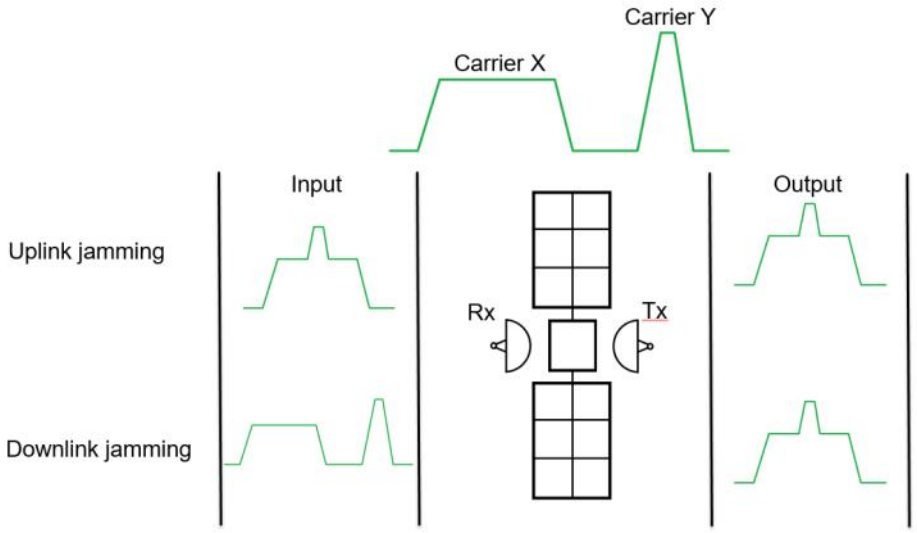
These geosynchronous gems have a variety of upgrades compared to the older DSCS satellites. Our focus is on the channelizer. This component allows Satellite Controllers to change and direct the signal path or flow through the satellite. DSCS and many commercial satellites work as a “bent pipe”. This means they primarily work by taking in a signal from one antenna, and then push the signal back to earth through another permanently determined antenna.

Meanwhile, a WGS satellite can be configured so that a signal can be pushed back to Earth through any of it's transmit antennas. This goes beyond connecting a single uplink path to a single downlink path. It also gives the capability to take a signal and push it to multiple antennas (fan out), or take several signals from different antennas and push it out one antenna (fan in). While giving greater flexibility, this is also the component that lets units conduct *downlink* jamming for training.

Uplink jamming is when an entity targets the signal going to the satellite and its equipment in an attempt to disrupt it. Downlink jamming instead focuses on disrupting the signals being sent down from the satellite to the receiver(s). The channelizer makes it possible to take a signal and layer it onto the desired signal (or signals). The ability to layer signals and fan signals out/in, allows the WGS constellation to produce downlink EMIs to simulate jamming. To an end user, this will have the same look and feel of uplink jamming, but in reality is only affecting the downlink signal. This EMI/jamming is referred to as a Wideband Authorized Injection Signal (WAIS).

Since June 8, 2020, the Regional SATCOM Support Centers (RSSCs) have had a formalized process to request Wideband EMI training support. A user will need to submit a Satellite Access Request (SAR) for whichever terminal will be providing the injection signal. It will need a list of the Joint Integrated SATCOM Tool ID's or mission numbers to be targeted for EMI training, and a completed wideband EMI Training checklist. Like all other SARs, the required lead time for submission is 45 days before the training date, but it is recommended to submit closer to 60 days out.

The injection signal supports training objectives like running operations while experiencing contested and degraded communications, or exercising local unit level EMI resolution. If a unit does not have enough equipment internally, or cannot get support from a higher echelon, coordination can be made to have your servicing large enterprise gateway be the source of your injection signal.



Given two normal carriers X and Y, diagram shows the difference between what the carrier X looks like when involved with an uplink jam and a WAIS downlink jam from carrier Y, begin received and transmitted from the satellite.
Graphic by George Gloyd

The best part of this is its wide applicability. Any certified and approved WGS terminal can be the target of a wideband authorized injection signal, or provide the signal used to layer onto others. Getting access to these resources only requires a SAR and another valid terminal participating. None of the fees associated with coordinating the alternative live fire exercise are required. Instead of having to be the primary focus, EMI training can now easily be added to other exercises and drills.

For more information on (WAIS) training support, contact your servicing RSSC, or the wideband consolidated SATCOM System Expert at usar-my.peterson.smdc.mbx.wideband-sse@mail.mil

Three lessons learned as a new FA 26B

Maj. John Geracitano
1st Armored Division

"You shut down the servers in the proper sequence, right?" This question surprised me, coming as it did in the thick of a crisis, in the middle of Warfighter 21-4. It turns out I did not follow the proper procedures, nor did I know them by heart--an embarrassing realization. Our server (TSIv2a) stacks were operating on their uninterrupted power supply (UPS) due to a generator failure and only had about ten minutes to avoid a hard shut down of the Division hardware. An improper shutdown sequence can result in corrupted virtual machines causing loss of data, collaboration tools, and unhappy users**.** With power restored and subject-matter expert (SME) coaching, fortunately, the servers came back online uncorrupted.

Graduating from the Information Systems Engineer (ISE) course four weeks prior, I quickly learned the significance a 26B can have on a Division-level staff (power-generation issues aside). I vowed to not let my ignorance and failure to practice essential tasks potentially impact operations again. Below are three lessons learned from my initial experience as a newly minted 26B.

Expand your sphere of influence: In a tactical environment, a 26B must ensure all tactical services are operational, with all Mission Command Information Systems (MCIS) integrated through the Data Dissemination Server (DDS). Although this is primarily a technical effort, it cannot be accomplished without forging relationships with each MCIS SME and understanding each component's requirements and signal flow throughout the network. The 26B must connect the dots, working synergistically with each Warfighting Function to achieve the CDR's intent.

"Feed the Beast": Be proactive. Keep leadership and all stakeholders informed of the status of services, MCIS publish/subscription through DDS, server maintenance downtime, etc.- before they ask. When reporting issues/problems, use layman's terms to frame the problem and recommend solutions that detail assessed risk and mitigation measures. Consistently leaning forward with timely and accurate reporting gives you the latitude to do your job without having to respond to seemingly incessant inquiries.

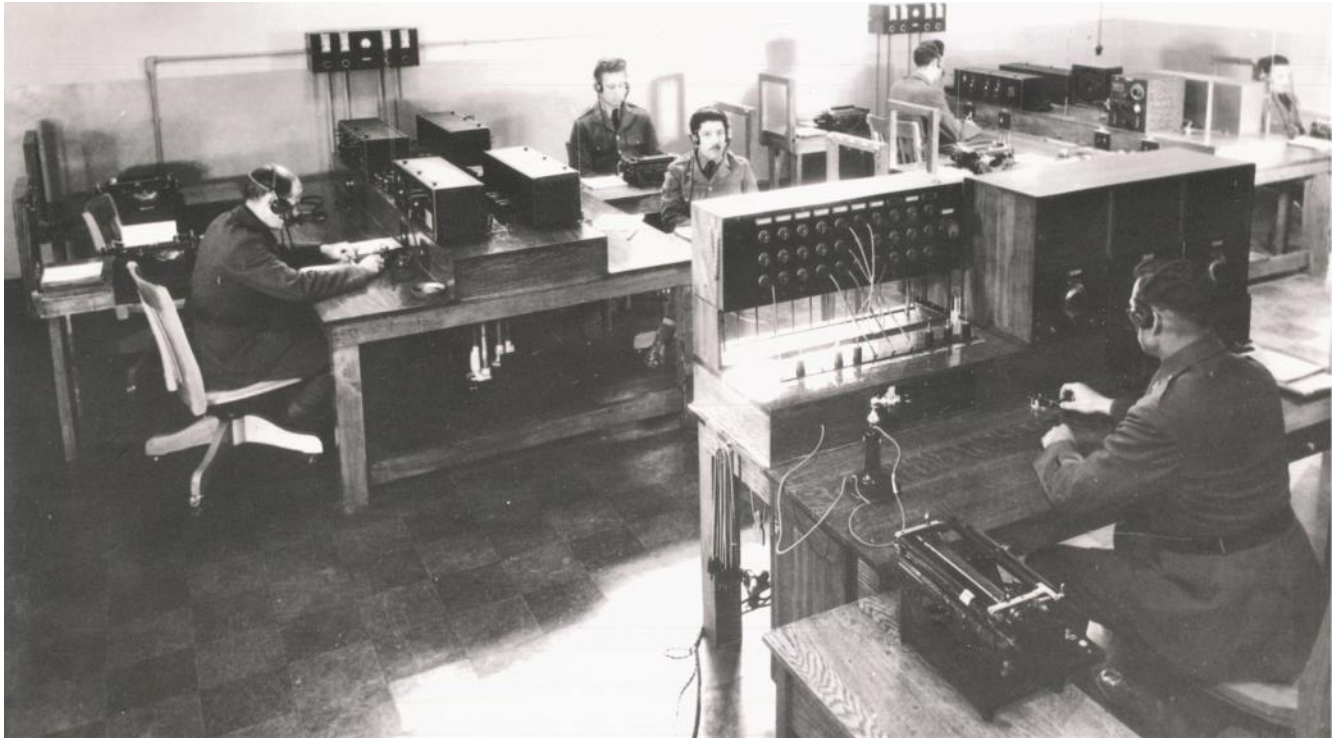
Develop checklists: This was my first revelation during the improper shutdown sequence incident. We did not have a consolidated and streamlined checklist readily available for this process and others. Take time to work with 255As to develop checklists that incorporate their tacit knowledge, validating them during training exercises. These checklists should be simple and thorough enough that anyone on the team can execute them.

8th Corps Area Message Center, January 1933

Steven J. Rauch
Signal Corps Branch Historian

The photo featured in this article is of the 8th Corps Area Message Center at Fort Sam Houston, Texas sometime in January 1933. Shortly after World War I, the War Department organized the US mainland into nine corps areas for the purpose of administration, training and tactical control. This included the recently organized National Guard and Army Reserve components that inhabited each of these areas. The 8th Corps Area included the states of Texas, Oklahoma, Colorado, New Mexico, and Arizona. The headquarters was at Fort Sam Houston.

Based on this organization, the Signal Corps established a signal service company in each area to serve as the agency to install, operate, and maintain communications. Later in 1922 when the War Department Radio Net came into existence, military radio linked each of these corps areas to a central net control center in Washington DC. By the 1930s, the operation of this strategic and operational network reflected one of the main tasks for the Signal Corps during a time of austere resources during the great depression.



Signal Corps Message Center, Fort Sam Houston, TX January 1933
Photo from Signal Historical Collection

The photograph depicts an unadorned, simple, uncluttered and functional radio operating facility featuring eight operating positions with the chief operator's position in the right foreground. The two box-like installations on the rear wall provide the necessary switching arrangements for charging and discharging the filament batteries, which are located immediately beneath those boxes. Plate power was furnished from rectifiers located on the shelf below the operating positions.

Next month's issue:

High Frequency Radio Training